# Savings Concepts and Vocabulary: Striving Toward Consistency Across Studies and Agencies

Itron Presentation

CEC workshop on Quantification of Savings Impacts from Programs, Standards and other Market Forces

# Overview

- Objective- Consistent comparisons and use of terms across models and agencies
- Efficiency and Conservation Terms
- Savings Terms Used in Forecasts
- Attribution of Savings to Market factors or Programs
- Level of Savings Reasonably Expected To Occur
- Savings Potential Estimates for Programs
- Request for Comments - Create new terms or modify old ones to achieve objectives?

# Efficiency and Conservation Concepts

| Term | Definition |
|---|---|
| Energy Intensity | Estimated kWh required to meet a specific level of energy service demanded or work within a given end use, building type, or customer class - usually defined as a UEC or EUI (energy use intensity) example=kWh/HH or square foot. Intensity changes include both efficiency effects and changes in the level of energy service; for example, customers may choose to increase or decrease the temperature setting for hot water delivery over time.[1] |
| Energy Efficiency | Using less energy to perform the same function (Source: CPUC Evaluator protocols). In forecasting area usually defined as a reduction in energy use or the number of kWh required to provide a constant or slightly increased level of service demand at the end use, building type, or customer class. This reduction is caused by the installation of a more energy efficient system or measure, not a reduction in the level of service provided. |
| Energy Efficiency Improvement | Reduced energy use for a comparable level of service, resulting from the installation of a more efficient measure or the adoption of an energy efficiency practice. |
| Conservation | Reduction in the level of energy services demanded by customers in response to media messages, changes in societal norms, or price signals that are often temporary in nature. For example, reduced hours of lighting usage or setting up thermostat set point temperature in a summer peak event as exhorted by the Flex Your Power campaign. |

[1] Intensities are usually measured at the end use level and thus imply saturation but energy intensities measured at the building level (e.g., kWh/HH) will also include the impacts of changes in equipment saturation over time

# Why Efficiency Terms Are Important

- Large differences between forecasting efficiency, conservation or both effects at once.
- Importance of whether conservation impacts are modeled as permanent or temporary response to price impacts.
- Energy intensity changes can mask both changes in equipment saturation and reductions in use due to energy efficiency effects.
- Conservation or Efficiency Reasonably Expected to Occur is Policy Issue.

# Savings Terms Used in Forecasts

| Term | Definition |
|---|---|
| Annual Savings (kWh) | A forecasted reduction in the energy intensity or UEC in a given end use or energy activity multiplied by the number of structural or consuming units forecast in a given year. |
| Cumulative Savings | The sum of annual savings estimated over a given time period measured relative to the baseline or reference year for savings calculations. |
| Baseline Year for Savings Calculations | Year which is used to start the savings calculation by freezing the energy efficiency for all end uses. |
| Frozen Efficiency Forecast | Baseline forecast constructed using forecasts of building stock, equipment saturation trends, and customer growth multiplied by frozen energy efficiency from the baseline year of the forecast. This forecast is intended to be used conceptually as the level of sales from which all types of program and non-program savings can be estimated. |

# Why Savings Terms Are Important

- Use of different baseline years in different models leads to large differences in cumulative savings (Potential models often use baseline years of one to five years back while forecast models can go back 15-20 years).
- Some models have steep “built in” expectations of naturally occurring conservation savings that can lead to double counting since program effects are in the recent baseline.

# Attribution of Observed or Estimated Savings to Program or Market Effects

| Term | Definition |
|---|---|
| Program Direct Savings - (Utility, State or Local) | Savings tied to installations by participants in programs that are directly claimed by those programs; in the CPUC EM&V protocols these savings are associated with incentive programs in which a specific measure installation is tied to a program payment. |
| Free rider | A program participant who would have implemented the program measure or practice in the absence of a program in a particular program cycle. A key issue with this term is how it relates to and is quantified, in practice, relative to assumed naturally occurring or long-term market effects. |
| Efficiency Program (induced) or Net Savings - (Utility, State or Local) | Gross program savings estimate less the savings estimated for the fraction of program participants who were free riders. This adjustment is often summarized as the net-to-gross adjustment or net-to-gross ratio. |
| Program (Induced) Indirect Savings | Estimated savings from program-induced efficiency adoption in current or future years that are incremental to Program Direct Savings. Used in CPUC EM&V EE protocols to refer to savings from programs that are typically information, education, marketing or outreach programs in which the program's actions are expected to result in energy savings achieved through the actions of the customers exposed to the program's efforts, without direct enrollment in an program that has energy savings goals. |

# Program/Market Attribution (continued)

| Term | Definition |
|---|---|
| Market Effects/Transformation | A change in the structure or functioning of a market or the behavior of participants in a market that result from one or more program efforts. Typically, these efforts are designed to increase the adoption of energy efficiency products, services, or practices and are causally related to market interventions. |
| Savings from Market Effects/Transformation | Estimated changes in adoption of more efficient products, services, or practices induced by the cumulative effects of programs. Examples of market effects include program induced changes in efficiency product prices, availability of product or awareness of products that lead to incremental savings in excess of direct program effects. |
| Standards (Induced) Savings | Savings attributed to the adoption of a building or appliance standards (state or national) that require the installation of equipment or systems with lower energy intensity or increased efficiency. |
| Naturally Occurring (Market-Driven or Baseline Savings) | Savings attributed to efficiency improvements that are independent of program effects. A key issue with this concept is how it relates and is quantified, in practice, in relation to program-induced market effects and free ridership. |
| Price Induced Savings | Includes any price-induced changes in customer behavior or operation of existing equipment that leads to a reduction in the underlying energy intensity. Note that, in the current staff forecast, all behavior-induced changes in energy intensity are included in this category. |
| Committed savings | The level of future energy and peak savings estimated to result from the subset of programs that are fully funded and authorized. |

# Why Attribution Terms are Important

- Different models use different methods of deciding whether observed savings are part of market change, past program effects or anticipated standards effects.
- Interaction of price-induced effects with efficiency gains from natural market changes modeled differently.
- Different rules for calibration of forecast sales to actual forecast - which variables to adjust, stock variables, equipment saturations or program effects/UEC's.

# Savings Reasonably Expected to Occur

- Committed savings -The level of future energy and peak savings estimated to result from the subset of programs that are fully funded and authorized.
- Uncommitted Savings - The residual savings from the total level of savings found reasonably expected to occur (CRETO or ESRETO) less committed savings. In the current policy setting, savings from CPUC annual savings goals for utilities out to 2020 might be considered CRETO or ESRETO, but since these future programs are not fully funded or authorized, some portion of these savings have been found to be uncommitted in past cycles. Similar issues for future building or appliance standards.

# Terms Used to Describe Potential Estimates

| Term | Definition |
|---|---|
| Technical Potential | Estimated savings that result when all customers adopt all of the efficiency measures found to be technically feasible from an engineering perspective over the period of study. This estimate does not include consideration of cost effectiveness or what fraction of the customers will be willing and able to adopt efficiency measures over time. Discuss early replacement vs. retrofit effects. |
| Economic Potential | Estimated savings that would result from the adoption of all measures found to be both technically feasible (from above) and cost effective when compared to the cost of alternative supply investments (or other agreed upon economic criteria). Typically economic potential looks at societal costs and benefits and does not include non-energy costs and benefits that may influence customer adoption. Estimates of economic potential may or may not include program costs as well. Discuss early replacement vs. retrofit effects. |
| Achievable Potential | The amount of savings that can be achieved due to specific program interventions, for example, as a function of information delivery and financial incentives. Achievable potential often differs fundamentally from economic potential in that the analysis estimates customers' willingness to adopt based on customer utility functions which can include direct financial net benefits (e.g., payback, rate of return, lifecycle savings, etc.) and other measure features (e.g., equivalence of energy service and non-energy costs and benefits).<br><br>Terms used in California potential studies for different types of achievable potential have included: *current* program potential, *business as usual, base, aggressive, full*, and *maximum achievable* potential, among others. All generally use forecasts of available program funding, rates, and avoided costs, along with measure-level costs and savings estimates, as inputs to consumer adoption modeling. Naturally occurring savings are often estimated directly in these models. |
| Conservation (*efficiency*) Reasonably Expected to Occur (CRETO) | The level of program and non-program induced energy savings found to be reasonably expected to occur over the forecast horizon. This has traditionally been defined as the sum of the committed and uncommitted savings estimates defined in Table 2. |

# Issues with Potential Savings Terms

- Relationship between estimates of *Achievable Potential*, *Economic Potential*, and *Adopted Savings Goals* - Between forecasting models and across policy proceedings.
- Role of Savings from Anticipated Standards - Part of Economic, Achievable or Goals?
- Interaction between *Conservation Reasonably Expected to Occur*, *Committed Savings* and *Uncommitted Savings* - which types of potential savings belong in the Baseline Forecast and which savings should be treated as Resources to be assessed against supply alternatives.

# Request for Comment

- Which terms need to be modified or eliminated to help achieve consistency across potential estimates and goal setting exercises?
- What criteria should be used in defining level of conservation or efficiency savings that are considered reasonably expected to occur?
- What is the relative importance of increasing the accurate estimates of total savings impacts vs. increasing the accuracy of efforts to accurately attribute savings to different market/program effects in the forecast?